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I Introduction

This article examines post-1978 agricultural reforms in China. Section II analyzes the marketization process of agricultural sector under the softliners' agricultural reforms during the 1978-1989 period. Section III looks at reforms under the hardliners during the 1989-2000 period. Section IV analyzes agricultural price policy in terms of the terms of trade between industry and agriculture. In Section V I estimate the total factor productivity index (TFPI) in agricultural sector and introduce a policy cycle with the TFPI. Section VI discusses the grain trade problem in China, while Section VII discusses the recent agricultural industrialization problem in China. Finally Section VIII discusses foregoing issues for the state and the market in China's agriculture.

II Agricultural Reforms under the Deng Xiaoping Regime

A The marketization process of the rural economy

Deng Xiaoping recovered from his downfall and took the power from Hua Guofeng at the Third Plenum of the Central Committee of the Chinese Communist Party (CCP) held in December of 1978. This plenum approved the 'Decisions concerning Some Problems on Accelerating Agricultural Development (Draft)'¹ and the "Regulations of People's Commune (Draft)"². The former draft proposed a new price policy, that is, an increase in government procurement prices of agricultural products and a decrease in modern inputs for agriculture, improving the terms of trade between the agricultural and the industrial sector. It also included unchanged consumer prices of grains and the stabilization of prices of sidedishes.

At the same time both drafts approved 'distribution according to work' in stead of 'malegalitarian distribution' which was caused by the work points system created by famous Dazhai People's Commune in Jiyang county of Shanxi province during the Great Cultural Revolution. The Party Committee of Jiyang county governing Dazhai People's Commune criticized the 'Learning Movement from Dazhai' in the People's Daily on October 3, 1979.³ The policy of 'distribution according to work' had led to the introduction of agricultural responsibility systems, which evolved into the household responsibility system which caused the decollectivization of People's Communes.⁴

The first document of the Party in 1983, "Some Problems on Present Rural Economic

Policies”⁵ admitted the *bao gan dao hu* system, i. e., the same household responsibility system as the fixed rental system, allowing the peasant employ seven workers at maximum in farming and engage in business in transporting and selling agricultural products by tractors, tracks, and ships owned by them.

The first document of the Party in 1984, the “Notice on Rural Work in 1984”⁶ allowed the peasant lease out their contracted farmland by an onerous contract while it admitted that the lease duration of farmland should be extended from one to three to more than 15 years.

It also insisted that regional economic cooperative organizations (RECOs) should provide peasants with social services. Social services meant having total charge over land and contracts, managing irrigation facilities and farm machinery, implementing plant protection and securing the prevention of epidemics, teaching and diffusing science and technology, maintaining irrigation systems and improving land, and providing other services before and after production.

RECOs are in fact good so as to manage public goods such as land, water, farm machinery, and R&D and so on. They can play an important role in avoiding market failures which are caused by public goods. This concept of the RECO was worked out by the Zhao Ziyang administration. But it faded out with the decline of General Secretary Zhao because of the Tian’anmen Incident on June 4, 1989. However, it seems that this idea still survives in the two-tier management system (*shuangceng jingying zhi*) where the collective economy provides peasants with social services under the household responsibility system.

B. The introduction of market mechanism

The market mechanism was in fact introduced into the economy in 1984. It gave the peasants such strong the incentives for production that grain production made a record level of 400 million tons in 1984 (see Table 1).

The first document of the Party in 1985, “Ten Policies To Revitalize Rural Economy Furthermore”⁷ approved the abolishment of the government procurement system for grains, the adoption of the contract purchasing system for grains, and peasant’s freedom of planting. Furthermore, it stressed the absorption of rural surplus labor by promoting township and village enterprises (TVEs), emphasizing for the first time industrial structural adjustment in rural areas.

The first document of the Party in 1986, “Arrangement of Rural Work in 1986”⁸ stressed the development of farm households specialized in farming (*zhuan yehu*) by enhancing the concentration of farmland into devoted farmers. This led to the formation of the family farm (*jiating nongchang*). The Seventh Five-Year Plan⁹ promoted the

Table 1 Grain Production and Population Growth in China, 1949-98

Year	Grain Production 10,000 tons	Sown Area 10,000 ha	Land Productivity kg/ha	Population Growth 10,000 persons	Grains Per Capita kg
1949	11318	10996	1029	54167	208.9
1952	16392	12398	1322	57482	285.2
1957	19505	13363	1460	64653	301.7
1962	16000	12162	1316	67295	237.8
1965	19453	11963	1626	72538	268.2
1970	23996	11927	2012	82992	289.1
1971	25014	12085	2070	85229	293.5
1972	24048	12121	1984	87177	275.9
1973	26494	12116	2187	89211	297.0
1974	27527	12098	2275	90859	303.0
1975	28452	12106	2350	92420	307.9
1976	28631	12074	2371	93717	305.5
1977	28273	12040	2348	94974	297.7
1978	30477	12059	2527	96259	316.6
1979	33212	11926	2785	97542	340.5
1980	32056	11723	2734	98705	324.8
1981	32502	11496	2827	100072	324.8
1982	35450	11346	3124	101654	348.7
1983	38728	11405	3396	103008	376.0
1984	40731	11288	3608	104357	390.3
1985	37911	11885	3190	105851	358.2
1986	39151	11093	3529	107507	364.2
1987	40298	11127	3622	109300	368.7
1988	39408	11012	3579	111026	355.0
1989	40755	11220	3632	112704	361.6
1990	44624	11347	3933	114333	390.0
1991	43529	11231	3876	115823	375.8
1992	44266	11056	4004	117171	377.8
1993	45649	11051	4131	118517	385.2
1994	44510	10954	4063	119850	371.4
1995	46662	11006	4240	121121	385.3
1996	50454	11255	4483	122389	412.2
1997	49417	11291	4377	123626	399.7
1998	51230	11379	4502	124810	410.5

Source: State Statistical Bureau, *China Statistical Yearbook* (various years)

'Sparkling Plan' (*xinghuo jihua*) aiming at the application and diffusion of results of science and technology to develop high yield varieties, mass production technology, and processing technology in the field of agriculture.

In January 1987 the Political Bureau issued the document, "Deepen Rural Reform,"¹⁰ which emphasized creating the two-tier management system and stabilizing the household responsibility system.

III Agricultural Reforms under the Deng-Jiang Regime

A. The Eighth Five-Year Plan(1991-95)

The two documents of the Party and the State Council issued in December 1990 and in November 1991, the "Notice on Agriculture and Agricultural Work in 1991"¹¹ and the "Decisions on Strengthening Agriculture and Agricultural Work Further"¹² put emphasis on promoting agricultural productivity by science and technology as well as constructing rural basic organizations. However, neither produced any new device on institutional reforms.

The State Council issued the "Decisions on Developing Agriculture of High Productivity, Good Quality, and High Efficiency (Summary)"¹³ in October 1992. The State Council issued the "Outline of Agricultural Development in the 1990s"¹⁴ in July 1993 saying that each province should basically self-supply grains while it should bring up foodgrain production bases and intend to diffuse high yield varieties. At the same time the Agricultural Law¹⁵ mirroring the Agricultural Basic Law in Japan was issued. This law stresses protecting peasant's rights and refers to the reform of grain distribution system.

In 1992 the government was determined to carry out the new reform of the grain distribution system.¹⁶ In this reform the government aimed at solving the budget deficit problem by raising consumers' prices up to producers' prices of grains, and decided to carry out two-tier management of grains at the central and provincial governments. The central government ceased to play a very important role of redistributing grains for the local governments while retaining the responsibilities for grain trade and the buffer stocks of grains for grain price stabilization. On the other hand, each local government should also have responsibilities for its annual balance of demand and supply for grains and buffer stocks within its territory. The State Council adopted the 'protective price' system, what is called the guaranteed price system. It is true that the government transformed the direct grain management system into an indirect one. But the government still keeps the dual-track system of grain prices.

B. The Ninth Five-Year Plan(1996-2000)

The Fifth Plenum of the 14th Central Committee of the CCP in September 1995 adopted the "Proposal on the Ninth Five-Year Plan and the Decision of the Long-Term Targets."¹⁷ And based on this proposal Premier Li made the "Report on the Outline of Ninth Five-Year Plan for the National Economy and Social Economic Development and the Long-Term Targets to the Year 2010"¹⁸ at the Fourth Session of the NPC in March 1996. In this report, the foodgrain production target is 490 million tons while the target of 500 million tons is pulled down to that of "efforts". Main points of the Ninth Five-Year Plan are as follows: (1) to guarantee the stable production increase in major crops such as grains, cotton, oil seed and so on; (2) to bring the agricultural productivity into the new level of production; (3) to guarantee increasing peasants' revenues, and raise their living standard into a stable level; and (4) to take agricultural productivity, the rural economy and the peasants' revenues into a new stage up to 2000.

In light of food problem the Plan stressed the following points: (1) to protect farmland according to law, to clear land, to increase the multiple cropping index so as to stabilize the planted area of grains in the long run; (2) to develop agricultural infrastructure (mainly irrigation), increase the effective irrigated areas, diffuse the technology of saving water, and enlarge the field of high productivity; (3) to accelerate improvement of low and medium productivity land, to construct foodgrain production bases if conditions of the land are good; (4) to strengthen agricultural promotion by science education, develop agriculture of high productivity, good quality, and high efficiency, and improve varieties; and (5) to develop industry of modern inputs, construct and improve chemical fertilizer factories, and supply much more agricultural films and machinery.

Agricultural industrialization aiming at enlarging the scale of operation has began in provinces such as Shandong and Zhejiang. At last in January 1996 the People's Daily contained an editorial that promoted agricultural industrialization so that the government would promote it all the more.¹⁹

C. Agricultural reforms under the Jiang-Zhu regime

On February 19, 1997 Deng Xiaoping, great grand designer of economic reforms died before the return of sovereignty of Hong Kong to China on July 1 in the same year he wanted to watch there. At the 15th Party Congress in September of the same year, Chairman Jiang Zemin made a speech²⁰ about building socialism with the Chinese characteristics following the theory of Deng Xiaoping. In this speech he pointed out that China would be in the first stage, and stressed on strengthening the basic position of agriculture, adjusting and optimizing the economic structure, insisting the development of agriculture with high yield, high quality, and high efficiency as well as with the

saving of water.

Premier Li Peng made the "Report on the Work of the Government"²¹ at the Fifth Session of the Eighth NPC in March 1997. The report stressed some points about agriculture as follows:

- (1) The government should keep it in mind that foodgrain production after the rich crop in 1996 should not decrease.
- (2) The government should carry out reform of the foodgrain distribution system, improve the protective price system, and strengthen the grain harvests and the buffer stocks.
- (3) Based on the principle of the "one main root and many other roots" the government should make the state-owned grain enterprise sector a major organization and make large grain consumers, cooperatives for purchases and sales, agriculture, reclamation work etc., suborganizations, thereby revitalizing the grain distribution system.
- (4) The government should maintain the governor responsibility system for the "rice bag" (*midaizi shengzhang zerenzhi*) and the mayor responsibility system for the "vegetable basket." (*cailanzi shizhang zerenzhi*)

New Premier Zhu Rongji made it clear at a press interview held by the First Session of the Ninth NPC that he would promote three objectives, that is, state enterprise reform, financial reform, and administrative reform at the press putting the reform of grain distribution system first among the five reforms.²² Government grain stockpiles in China amounted to the historic level owing to the rich harvests during the 1995-97 period. Since it led to a big budgetary burden, the government would need the further reform. The State Council enacted the Grain Purchasing Regulations²³ in June 1998 saying that only state grain enterprises are allowed to purchase grains directly from peasants at protective prices. Therefore, private merchants are forbidden to buy grains in the rural areas.

Premier Zhu Rongji made the "Report on the Work of the Government"²⁴ at the Second Session of the Ninth NPC in March 1999. In this report he stressed the establishment of two-tier management system based on the household responsibility system under the spirit of the Party in the Third Plenum of the 15th Central Committee of the CCP. He also stressed an increase in modern inputs, the overall development of agriculture and the rural economy, and an increase in revenues of peasants. In order to achieve these objectives, he raised the following five points:

- (1) to adjust and optimize the agricultural structure. Many agricultural products are in oversupply. Especially in terms of foodgrain production the government must

stabilize the total amount of grain production and increase the foodgrain production of higher grade.

- (2) to consolidate the agricultural infrastructure based on irrigation.
- (3) to revitalize the distribution of agricultural produce by promoting the reform of the foodgrain distribution system positively. The government was to accomplish the deepening of the state enterprise reform as well as the three-point policy, i. e., for the government to make unlimitedly purchases of surplus grains from peasants at the protective prices, for the state grain enterprises to sell grains at the prices on the regular spread, and the unification of funds purchasing the agricultural produce
- (4) to make the structural adjustment of the TVEs and promote constructing small cities.
- (5) to alleviate the burdens of peasants and maintain the stability of villages.

IV. The Changes in Agricultural Price Policy

The changes in the terms of trade between industry and agriculture during the 1950-77 period are depicted in Table 2 and Figure 1. The terms of trade index(TTI) drastically decreased from 100.0 in 1952 to 52.5 in 1977. This fact shows that prices of agricultural products increased compared with those of industrial products. Generally speaking, in socialist countries prices of industrial goods were set higher than those of agricultural goods. This is due to the primitive socialist capital accumulation process, as mentioned by a Russian economist Preobrazhensky.²⁵ The government keeps the prices of foodgrains as wage-goods so low that the industrial sector can make the wage rates low. The industrial sector can keep the prices of capital goods high to gain high profits. The high profits enable the industrial sector to invest in reproduction on an expanded scale. This is what is called classical economic growth theory.

China, however, slowly raised the prices of agricultural products to give the peasants incentives for production until the beginning of the agricultural reforms in 1978. But most of the increase in grain production was absorbed by the increase in population. This showed the Malthusian trap which had been predicted by Ma Yinchu, President of Beijing University in the 1950s.²⁶ Mao Zedong's thought that the more population would assist economic development brought about this Malthusian trap.

Table 2 and Figure 1 followed that the TTI declined 18.0 percent from 50.5 in 1978 to 41.4 in 1979. It was Deng Xiaoping's new price policy that resulted in such effect. The TTI decreased to 33.7 in 1985 when the market mechanism was formally introduced into the Chinese economy. Furthermore, the TTI declined during the

Table 2 Price Indices in China, 1951-98

Year	General Retail Price Index	General Consumer Price Index for Urban Areas	General Farm and Sideline Products Purchasing Price Index	General Industrial Products Rural Retail Price Index	Terms of Trade between Industry and Agriculture
1951	112.2(12.2)	112.5(12.5)	119.6(19.6)	110.2(10.2)	92.1
1952	111.8(-0.4)	115.5(2.7)	121.6(1.7)	109.7(-0.5)	90.2
1953	115.6(3.4)	121.4(5.1)	132.5(9.0)	108.2(-1.4)	81.7
1954	118.3(2.3)	123.1(1.4)	136.7(3.2)	110.3(1.9)	80.7
1955	119.5(1.0)	123.5(0.3)	135.1(-1.2)	111.9(1.5)	82.8
1956	119.5(0.0)	123.4(-0.1)	139.2(3.0)	110.8(-1.0)	79.6
1957	121.3(1.5)	126.6(2.6)	146.2(5.0)	112.1(1.2)	76.7
1958	121.6(0.2)	125.2(-1.1)	149.4(2.2)	111.4(-0.6)	74.6
1959	122.7(0.9)	125.6(0.3)	152.1(1.8)	112.4(0.9)	73.9
1960	126.5(3.1)	128.8(2.5)	157.4(3.5)	115.5(2.8)	73.4
1961	147.0(16.2)	149.6(16.1)	201.4(28.6)	121.2(4.9)	60.2
1962	152.6(3.8)	155.3(3.8)	200.1(-0.6)	126.6(4.5)	63.3
1963	143.6(-5.9)	146.1(-5.9)	194.4(-2.8)	125.3(-1.0)	64.5
1964	138.3(-3.7)	140.7(-3.7)	189.5(-2.5)	122.9(-1.9)	64.9
1965	134.6(-2.7)	139.0(-1.2)	187.9(-0.8)	118.4(-3.7)	63.0
1966	134.2(-0.3)	137.3(-1.2)	195.8(4.2)	115.0(-2.9)	58.7
1967	133.2(-0.7)	136.4(-0.6)	195.5(-0.1)	114.1(-0.8)	58.4
1968	133.3(0.1)	136.5(0.1)	195.2(-0.2)	113.8(-0.3)	58.3
1969	131.8(-1.1)	137.8(1.0)	194.9(-0.2)	112.1(-1.5)	57.5
1970	131.5(-0.2)	137.8(0.0)	195.1(0.1)	111.9(-0.2)	57.4
1971	130.5(-0.7)	137.7(-0.1)	198.3(1.6)	110.2(-1.5)	55.6
1972	130.2(-0.2)	137.9(0.2)	201.1(1.4)	109.6(-0.5)	54.5
1973	131.0(0.6)	138.0(0.1)	202.8(0.8)	109.6(0.0)	54.0
1974	131.7(0.5)	138.9(0.7)	204.5(0.8)	109.6(0.0)	53.6
1975	131.9(0.2)	139.5(0.4)	208.7(2.1)	109.6(0.0)	52.5
1976	132.3(0.3)	139.9(0.3)	209.7(0.5)	109.7(0.1)	52.3
1977	135.0(2.0)	143.7(2.7)	209.2(-0.2)	109.8(0.1)	52.5
1978	135.9(0.7)	144.7(0.7)	217.4(3.9)	109.8(0.0)	50.5
1979	138.6(2.0)	147.4(1.9)	265.5(22.1)	109.9(0.1)	41.4
1980	146.9(6.0)	158.5(7.5)	284.4(7.1)	110.8(0.8)	39.0
1981	150.4(2.4)	162.5(2.5)	301.2(5.9)	111.9(1.0)	37.2
1982	153.3(1.9)	165.8(2.0)	307.8(2.2)	113.7(1.6)	36.9
1983	155.6(1.5)	169.1(2.0)	321.3(4.4)	114.8(1.0)	35.7
1984	160.0(2.8)	173.7(2.7)	334.2(4.0)	118.4(3.1)	35.4
1985	174.1(8.8)	194.4(11.9)	362.9(8.6)	122.2(3.2)	33.7
1986	184.5(6.0)	208.0(7.0)	386.1(6.4)	126.1(3.2)	32.7
1987	198.0(7.3)	226.3(8.8)	432.4(12.0)	132.2(4.8)	30.6
1988	234.6(18.5)	273.1(20.7)	531.9(23.0)	152.3(15.2)	28.6
1989	276.4(17.8)	317.6(16.3)	611.7(15.0)	180.8(18.7)	29.6
1990	282.2(2.1)	321.7(1.3)	585.8(-2.6)	189.1(4.6)	31.7
1991	290.4(2.9)	338.1(5.1)	583.9(-2.0)	194.8(3.0)	33.4
1992	366.1(26.1)	367.2(8.6)	603.8(3.4)	260.8(3.1)	33.3
1993	346.5(-5.4)	368.4(0.0)	684.7(13.4)	224.5(-13.9)	32.8
1994	421.5(21.7)	532.2(25.0)	957.2(39.9)	262.8(17.2)	27.5
1995	483.9(14.8)	621.6(16.8)	1147.7(11.9)	301.5(14.7)	26.2
1996	513.4(6.1)	676.3(8.8)	1195.9(4.2)	320.2(6.2)	26.8
1997	517.5(0.8)	693.3(2.5)	1142.0(-4.5)	323.7(1.1)	28.3
1998	504.0(-2.6)	686.4(-1.0)	1050.7(-8.0)	316.6(-2.2)	30.1

Source: State Statistical Bureau, *Statistical yearbook of China* (various years).

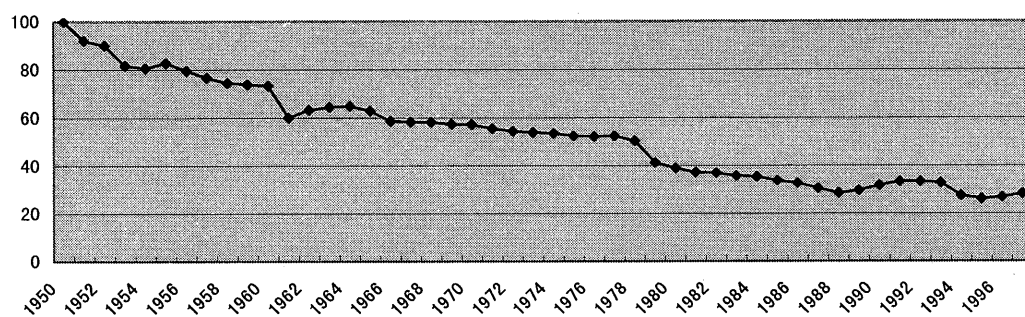
Notes: 1. All indices are 100 in 1950.

2. Figures in parentheses show growth rates.

3. The general consumer price index for urban areas before 1978 is from living cost index of workers and stuff.

4. Terms of Trade is the ratio of the rural and retail price index of overall industrial products to the purchasing price index of general farm and sideline products.

Fig.1 Terms of Trade between the Industrial and Agricultural Sectors, 1950-98



Note: 1950=100.

1986-88 period. However, the increase of the TTI from 29.6 in 1989 to 33.4 in 1991 brought about inflationary pressures. That is to say, the Chinese economy faced the wage-price spiral. According to Table 2 and Figure 1 the increasing rate of general retail price index was almost the same as that of the general consumer price index (GCPI) as a wage index during the 1978-84 period. But the latter surpassed the former during 1985-97 with exceptions of 1989 and 1990. This shows that the government cannot determine the terms of trade between industry and agriculture independent of the determination of the wage rate in the industrial sector.

Table 2 and Figure 1 showed that the TTI went up during the 1997-99 period, favoring the agricultural sector. Furthermore, the growth rate of the GCPI showed 0.8 percent in 1997 and -2.6 percent in 1998 so that the Chinese economy was clearly in a phase of deflation. The index of agricultural purchase prices in Table 2 was -4.5 percent in 1997 and -8.0 percent in 1998, showing deflation. This was clear evidence that China had already entered into the age of overproduction in the agricultural sector.

Price reform in China has been making a rapid progress. According to Table 3 and Figure 2, as of 1997 the share of agricultural products traded with market prices to the total agricultural produce in value terms reached 80.5 percent. At the same time the share of the retailed commodities traded with market prices to the total retailed commodities reached 93.2 percent while the share in the case of production materials 81.6 percent.

China finds it necessary to lower domestic prices of foodgrains which are already higher than international prices in order to join the WHO. At the moment China is at a turning point in the adoption of structural adjustment policy rather than price policy.

V. Agricultural Production and Policy Cycle

A. The estimation of total factor productivity index in China's agriculture

I estimated the total factor productivity index (TFPI) in agricultural sector in China in Table 4 and Figure 3. Figure 4 shows factor inputs in China's agriculture. My method of estimation is essentially based on Tang.²⁷ Tang's data are all from the U. S. government data. They are estimated from fragmented data of the Chinese origins. However, all the data that I used are from the Chinese statistics.

The TFPI in 1978 before the agricultural reform was 95.69 compared with 100.00 in 1952. Agricultural reform increased the TFPI from 99.70 in 1978 to 124.18 in 1984, when the market mechanism was in fact introduced into the Chinese economy. After

Table 3 Composition of Three Kinds of Prices in the Marketization of the Economy,
1990-97 (unit:%)

		1990	1991	1992	1993	1994	1995	1996	1997
Total Retail Sales of Consumer Goods	GPPs	29.8	20.9	5.9	4.8	7.2	8.8	6.3	5.5
	GPPs	17.2	10.3	5.1	1.4	2.4	2.4	1.2	1.3
	MPs	53.0	68.8	93.0	90.4	90.4	88.8	92.5	93.2
Total Purchases of Agricultural Products	GPPs	25.0	22.2	12.5	10.4	16.6	17.0	16.9	16.1
	GPPs	23.4	20.0	5.7	2.1	4.1	4.4	4.1	3.4
	MPs	51.6	57.8	81.8	87.5	79.3	78.6	79.0	80.5
Total Sales of Producer Goods	GPPs	44.6	36.0	18.7	13.8	14.7	15.6	14.0	13.6
	GPPs	19.0	18.3	7.5	5.1	5.3	6.5	4.9	4.8
	MPs	36.4	45.7	73.8	81.1	80.8	81.1	81.1	81.6

Source: *Zhongguo Wujia Nianjin Bianjibu* (The Editing Section of the Price Yearbook of China), *The Price Yearbook of China 1998*, 1998.

Notes: 1. GPPs stand for Government Procurement Prices.

2. GPPs stand for Government Guidance Prices.

3. MPs stand for Market Prices.

Fig.2 Composition of Trade by Three Kinds of Agricultural Prices, 1990-97

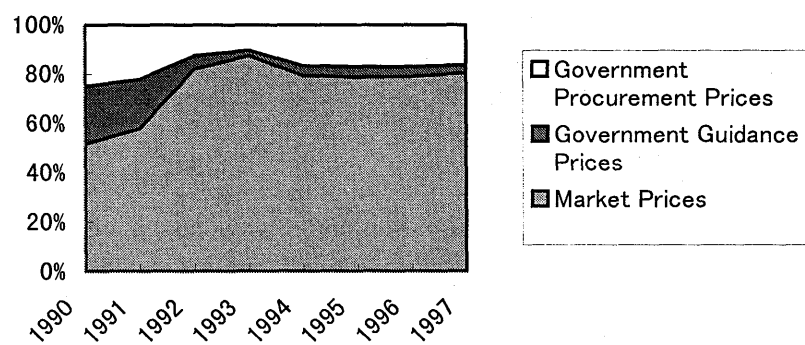


Table 4 Estimation of Total Factor Productivity Index, 1952-98

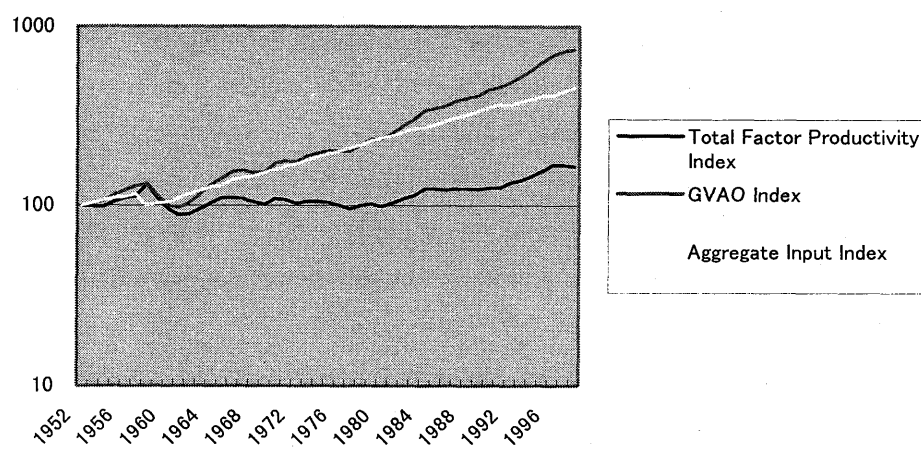
	Total Factor	GVAO	Aggregate	Input Categories			
	Productivity Index	Index	Input Index	Land	Labor	Capital	Currentt Input
1952	100.00	100	100.00	100.00	100.00	100.00	100.00
1953	99.46	103.10	103.66	101.97	102.47	107.78	108.15
1954	99.38	106.60	107.26	104.72	104.80	112.23	116.39
1955	105.03	114.70	109.21	106.96	107.33	110.10	118.63
1956	108.52	120.50	111.04	112.68	107.04	105.99	124.98
1957	108.29	124.80	115.25	111.32	111.46	109.25	137.77
1958	128.00	127.80	99.84	107.60	84.20	108.24	133.48
1959	107.54	110.40	102.66	100.81	93.88	108.66	130.99
1960	92.39	96.40	104.34	106.60	98.15	107.61	118.97
1961	85.83	94.10	109.63	101.39	113.94	105.54	111.76
1962	91.12	99.90	115.50	99.27	122.77	113.53	119.57
1963	92.31	111.50	120.79	99.27	131.54	117.98	138.63
1964	99.73	126.70	127.04	101.61	131.54	125.54	155.11
1965	106.08	137.10	129.24	101.44	134.97	135.68	152.10
1966	106.81	149.20	139.50	103.59	140.18	145.53	192.53
1967	105.63	151.30	143.24	102.61	145.19	156.54	195.62
1968	101.45	147.60	145.49	98.99	150.37	168.91	191.07
1969	97.70	149.20	152.72	99.78	156.46	182.75	198.28
1970	99.87	157.80	158.01	101.58	160.46	198.32	217.00
1971	98.56	162.90	165.28	103.13	163.81	230.56	230.21
1972	94.32	161.20	170.91	104.72	163.13	274.20	240.17
1973	97.07	174.50	179.77	105.16	166.44	327.02	250.39
1974	97.00	180.70	186.28	105.22	165.51	382.68	249.61
1975	95.60	186.30	194.92	105.87	169.87	455.13	253.30
1976	92.06	185.50	201.50	105.99	169.77	508.45	261.72
1977	88.16	184.80	209.62	105.72	169.17	585.50	267.30
1978	91.85	199.80	217.53	106.26	163.51	656.70	290.21
1979	93.75	214.8	229.12	105.11	165.33	734.60	311.42
1980	91.51	217.9	238.62	103.63	168.15	800.80	323.69
1981	93.61	230.50	246.23	102.76	171.93	852.70	328.67
1982	99.60	256.50	257.53	102.48	178.18	904.20	348.15
1983	103.37	276.50	267.48	101.94	179.86	976.90	362.49
1984	113.72	310.40	272.96	102.10	178.23	1052.60	353.65
1985	112.70	321.00	283.94	101.68	179.63	1124.70	374.85
1986	111.64	331.80	297.22	102.11	180.25	1226.80	394.42
1987	113.51	351.00	309.23	102.62	182.57	1321.10	401.11
1988	113.16	364.90	322.46	102.56	185.94	1409.50	419.31
1989	112.03	376.20	335.80	103.75	191.56	1480.80	440.00
1990	114.09	404.90	354.88	105.03	221.90	1514.70	441.37
1991	111.51	408.50	366.35	105.76	223.41	1548.61	488.93
1992	123.88	425.70	343.65	105.49	204.14	1593.93	505.41
1993	118.34	447.80	378.39	104.59	216.18	1671.65	533.39
1994	118.77	462.10	388.72	104.94	210.72	1773.85	561.55
1995	122.23	498.60	407.91	106.10	204.83	1891.09	599.06
1996	136.67	537.50	393.27	107.88	200.79	2014.17	629.87
1997	167.78	728.71	434.32	109.00	200.57	2151.15	611.16
1998	164.37	743.86	452.56	110.23	200.61	2305.95	627.30

Notes: 1.The estimation method depends on Tang, A. M., *An Analytical and Empirical Investigation*

of Agriculture in Mainland China, 1952-1980, Taipei: Chung-Hua Institution of Economic Research, 1984.

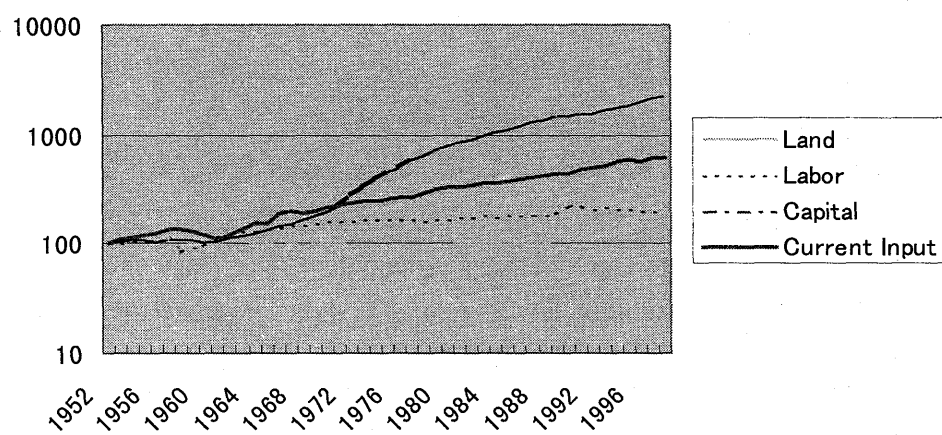
2. The GVAO data at the 1980 prices during 1949-1986 are taken from *Zhongguo Nongcun Jingji Tongji Dachuan 1949-1986* (Planning Section, Ministry of Agriculture ed., *Chinese Rural Economic Statistics*, Beijing: Noyechubannsha 1986). Also the GVAO data are taken from Statistical Yearbook of China and Rural Statistical Yearbook of China (various years). And I estimated the GVAO data at the 1990 prices. Other data are also taken from statistical Yearbook of China (various years). Land input means total planted area, labor input the number of workers in the primary industry, and capital input total horsepower of farm machinery plus large domestic animals in terms of horsepower where a Large domestic animal is equivalent with 0.52 horsepower. Current input stands for chemical and organic fertilizers applied. The estimation method of current inputs depends on Tang's one. The calculation method of aggregate input is as follows: $0.25(\text{land input index}) + 0.50(\text{labor Input index}) + 0.1(\text{capital input index}) + 0.15(\text{current input index})$, where the distribution rate for land, labor, capital, and current inputs are 0.25, 0.50, 0.10, and 0.15 respectively.

Fig. 3 Total Factor Productivity in China's Agriculture, 1952-98



Note: 1952=100

Fig. 4 Factor Inputs in China's Agriculture, 1952-98



Note: 1952=100

that the TFPI was stagnant until 1991 and increased to 168.31 in 1996 which was a post-1952 historic record since 1952. Then the TFPI declined to 167.78 in 1997 and to 164.37 in 1998. It is true that the marketization process of agricultural sector in China increased the TFPI. However, it is also clear that the TFPI had ups and downs. Here I would like to estimate a policy cycle from the TFPI.

The annual growth rate of the TFPI during the period of 1952-98 is 1.086 percent which is not so high enough for sustainable growth. The contribution rate of the TFP for production is calculated as the annual growth rate of the TFPI to that of labor productivity. It is 24.35 percent, a figure which is low compared with advanced countries. China stresses that it should raise the contribution rate to the higher level of 60 percent in the long run.²⁸

B. The estimation of policy cycle

It is true that political affairs and the changes in economic policies said above brought about a policy cycle. Tang²⁹ found a policy cycle in the agricultural sector in China. The production function Tang used to find the policy cycle is as follows:

$$Y_c = 106.530 - 6.607D_1 - 3.155D_2 - 0.415X$$

where $Y_c = \text{TFPI}$

$D_1 =$ dummy variable for a poor crop

$D_2 =$ dummy variable for a average crop

$X =$ time trend for technical progress

If influences of the weather and technical change are eliminated from the estimated TFPI, the residuals change with changes in economic policies.

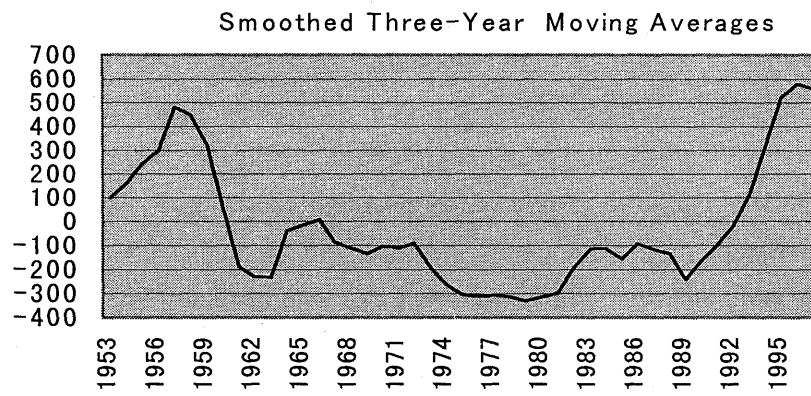
In terms of weather whether a crop is poor or rich or averaged depends on the data on damaged areas from natural disaster and the gross value of agricultural output (GVAO). Furthermore, the three-year moving average of the residuals is taken in order to eliminate the random component of the residuals.

Looking at the policy cycle, the centralization of power such as the First Five-Year Plan, the Socialist Reform, the Great Leap Forward Movement, the Great Cultural Revolution, the Pi Lin Pi Kong Movement, and the ascent of the Gang of Four led to decreased productivity. On the other hand, the decentralization of power such as the Land Reform, and the policy of "readjustment" led to increased productivity.

But Tang's regression results have the following problems:

- (1) The sign of coefficient of technical progress is negative.
 - (2) Most calculations are made mainly from the data from the U. S. government.
 - (3) The estimation period is the 1952-80 period, not including the Deng Xiaoping era.
- With this in mind, I estimated the TFPI from the Chinese statistics and arrived at a

Fig. 5 Policy Cycle in China's Agriculture, 1953-97



Note: 1953 = 100

new equation. My estimation of the equation is as follows.

$$Y_c = 97.482 - 11.661D1 - 8.837D2 + 0.970X$$
$$(19.210) \quad (-2.447) \quad (-1.882) \quad (6.630)$$
$$R^2 = 0.562$$
$$D. W. = 0.392$$

However, figures in parenthesis under the coefficients stand for t -values. R^2 stands for the adjusted coefficient of determination. D. W. stands for Durbin-Watson statistic. The result of estimation is not statistically sufficient. However, the policy cycle induced from this equation shows the same result as Tang. Figure 5 shows the policy cycle I estimated.

Looking at the policy cycle, hardliners' centralization of power such as the First Five-Year Plan, the Socialist Reform, the Great Leap Forward Movement, the Great Cultural Revolution, the Pi Lin Pi Kong Movement, and the ascent of the Gang of Four, the Tian'anmen Incident led to decreased productivity. On the other hand, softliners' decentralization of power such as the Land Reform, the policy of readjustment, and the economic reform and the agricultural reform by Deng Xiaoping resulted in increased productivity.

It is noteworthy that the productivity turned upward since 1981 and that the policy cycle reached to the highest level in 1996. This fact shows that the liberalization in agricultural policy under the Deng regime made the TFPI go up. However, it should be noted that the productivity turned down in 1997. This downturn of the productivity was due to the fact that the government could not help adopting the governor responsibility system for the rice bag and the mayor responsibility system for the vegetable basket when it faced deflation and agricultural overproduction, and the terms of trade unfavorable to the agricultural sector.

VI. Grain Trade in China

A. The trend of grain trade

Table 5 shows the trend of grain trade in China. In terms of grain imports wheat is the major import grain. On the other hand, rice is the major import grain. Mah³⁰ proposes an interesting hypothesis of the policy of 'fair price' about China's grain trade, saying that China exports rice while it imports wheat. Because the international price of rice is always higher than that of wheat so that China can import a lot of wheat with the foreign exchange earning from the export of rice.

The net import of grains showed negative during the 1952-55 period and during the 1956- 60 period. After 1960 it turned positive every year, getting to a high level of

Table 5 Grain Trade in China, 1953-98

(unit: 10,000 tons)

Year	Import		Export		Net Import	Importing Cost US \$ million
	Wheat	Grains	Rice	Grains		
1953-1955Average	2.1	7.6	34.0	192.4		
1956-1960Average	7	12.2	110.0	290.1		
1961	388.17	580.97	44.4	135.50	445.47	577.08
1962	353.56	492.30	57.8	103.09	389.21	360.51
1963	558.77	595.20	64.0	149.01	443.19	592.49
1964	536.87	657.01	78.4	182.08	474.93	648.43
1965	607.27	640.52	75.3	241.65	398.87	460.45
1966	621.38	643.78	126.4	288.50	355.28	636.34
1967	439.46	470.19	119.8	299.44	170.75	464.27
1968	445.14	459.64	96.7	260.13	199.51	452.70
1969	374.02	378.63	81.1	223.75	154.88	376.07
1970	530.21	535.96	98.6	211.91	324.05	527.59
1971	302.20	317.32	92.4	261.75	55.57	310.11
1972	433.36	475.62	89.9	292.56	183.06	470.72
1973	629.85	812.79	214.2	389.31	423.48	806.43
1974	538.34	812.13	198.3	364.39	447.74	862.13
1975	349.12	373.50	144.0	280.61	92.89	368.47
1976	202.19	236.65	90.0	176.47	60.18	231.20
1977	687.58	734.48	70.0	165.70	568.78	633.68
1978	766.73	883.25	137.0	187.72	695.53	1001.70
1979	870.98	1235.53	110.0	165.08	1070.45	1644.22
1980	1097.17	1342.93	100.0	161.83	1181.10	2258.46
1981	1307.01	1481.22	59.0	126.08	1355.14	2735.71
1982	1353.43	1611.69	47.0	125.12	1486.57	2914.11
1983	1111.00	1353.00	58.0	115.00	1238.00	1934.72
1984	987.00	1041.00	116.0	319.00	878.40	1712.38
1985	538.00	597.00	101.0	933.00	-366.00	-365.03
1986	611.00	773.00	95.0	942.00	-169.00	-229.38
1987	1320.00	1628.00	102.0	737.00	891.00	740.46
1988	1455.00	1533.00	70.0	717.00	816.00	707.37
1989	1488.00	1658.00	32.0	656.00	1002.00	1799.14
1990	1253.00	1372.00	33.0	583.00	789.00	1333.83
1991	1237.00	1345.00	69.0	1086.00	259.00	61.3
1992	1058.00	1175.00	95.0	1364.00	-189.00	-243.78
1993	642.00	752.00	143.0	1535.00	-783.00	-839.15
1994	730.00	920.00	152.0	1346.00	-426.00	-955.01
1995	1159.00	2081.00	5.0	214.00	1867.00	3096.27
1996	825.00	1223.00	27.0	198.00	1025.00	2268.90
1997	186.00	417.00	94.0	834.00	-417.00	-401.93
1998	149.00	388.00	375.0	889.00	-501.00	-860.16

Source: State Statistical Bureau, *China Statistical Yearbook* (various years)

14.87million tons in 1982. It showed negative both in 1985 and in 1986. It recorded the highest level of 18.67 million tons in 1995, decreasing to 10. 25 million tons in 1996. On the contrary, it showed negative both in 1997 and in 1998. This fact suggest that China is now in a position of oversupply of grains.

The net import cost of grains basically showed the sign of plus for many years while it showed the sign of plus in 1985 and 1986, and during1992-94 and 1997-98.

What are major causes to determine the grain trade mentioned above in China?

Here I estimated the import function of grains and the export function of rice respectively in order to show Mah's hypothesis.

The import function of grains is estimated as follows.

$$\log M = 0.705 + 0.684 \log(P_w / P_r) + 0.751 \log GDP$$

(0.430) (3.579) (3.505)

$$R^2 = 0.369$$

$$D.W. = 1.171$$

Where M= the import of grains (unit: 10 thousand tons)

P_w = the price index of wheat produced in the U. S. (1990=100.0)

P_r = the price index of rice in Beijing(1990=100.0)

GDP = the index of the real GDP in China(1990 constant price)

Figures in parenthesis are t-values. The period of estimation is 1972-98

In this estimation the coefficient of the relative price P_w / P_r is significant at the 5 percent level and shows that the elasticity of the relative price with the import of grains is not elastic, being less elastic than that of GDP.

On the other hand, the export function of rice is estimated as follows.

$$E = 272.542 + 0.019(P_r / P_w) - 0.652C - 1.008Y$$

(5.586) (0.315) (-4.120) (-3.061)

$$R^2 = 0.659$$

$$D. W. = 1.583$$

Where E= the export of rice (unit: 10 thousand tons)

P_r = the price index of rice in Beijing (1990=100.0)

P_w = the price index of wheat produced in the U. S.(1990=100.0)

C= real net imported costs

Y= rice production in the previous year

The period of estimation is 1974-98. C is the net importing costs in terms of yuan deflated by the general retail price index in China. This estimated equation is not statistically significant. However, coefficient fills its sign condition and is significant at the one percent level.

Both results of estimation may prove that Mah's hypothesis is still effective in explaining the grain trade pattern in China.

B. The great transformation of grain trade policy

In 1995 Du Lunsheng who was a thinker in the Zhao Ziyang administration said China might import grains of 30-35 million tons or even up to 40 million tons at maximum in the near future.³¹ This prediction was based on the fact that as the Chinese food consumption pattern changed the consumption of meat increased so much that China had to import grains as feed of domestic animals.

According to *Nihon keizai shimbun* on February 9, 2000, the State Council abolished its grain self-supply policy, saying that it would become the net importer of grains. Total imports of grains in China in 1999 amounted to 7.71 million tons, increasing by 9 percent from 1998. Of this total the import of soybean amounted to 4.32 million tons, recording a 49.4 percent increase compared with the previous year. On the other hand, total exports of grains in 1999 decreased 16.3 percent to 7.58 million tons. Therefore, the balance of grain trade was the net imports of 130 thousand tons.

The rich harvest every year after 1996 in China enabled the government to provide itself with the sufficient stockpiles of grains while it led to the decrease in grain prices. As a result, the government was obliged to take policy measures of the protective price to make the market intervention so that the fiscal burdens of the government rapidly increased.

China will have to open its domestic market to join the WTO. China has been giving peasants incentives for production by raising prices of agricultural produce since 1978. So far, so good. China has changed from a country with a food shortage to one with a food surplus. This leads to producer prices of grains in China much higher than those in the world market. This indicates that China's agricultural price policy will reach its limit, requiring the government to carry out a structural adjustment policy in order to raise agricultural productivity. This is a short story for the government to determine the transformation of grain trade policy.

VII. Toward the Agricultural Industrialization

A. The theoretical foundations for the agricultural industrialization³²

In 1993 the government tried to stress the policy of '*mao gong nong yi ti hua, chan jia xiao yi tiao long*' (the unification of trade, manufacturing, and agriculture, the vertical integration of production, processing, and selling). Then the theory of the unification of agriculture and industry (TUAI) appeared. In 1992 Shandong province

carried out the first experiment of the TUAI in China. The foundation of the TUAI is the development strategy of the unification of agriculture and industry establishing the leading industry and realizing the management of economies of scale based on the *long tou qi ye* (the major enterprise). There are some reasons why this strategy appeared: (1) the locomotion problem of agricultural development, (2) the excessive division of agriculture and industry, and the burdening of management with rules and regulations, (3) inefficiencies of the management of the peasant, and (4) the extension of the external economy.

The content of the unification of agriculture and industry is as follows: (1) specialization in production, (2) location and regionalization, (3) the unification of management, (4) socialization of services, and (5) the industrialization of management.

The significance and effects of the unification of agriculture and industry are as follows: (1) to support and aid the market entry of peasants, (2) to form a system of profit sharing within the agricultural and industrial organization, (3) to realize highly efficient agriculture by industrial structural adjustment, (4) to strengthen migration of peasants and accelerate the process of unifying urban and rural areas, and (5) to make farm management adopt modern technology and transform traditional agriculture.

B. The model of the unification of agriculture and industry

There are several models about the UAI as follows:

(1) the type of the '*longtou*' (leading) enterprise: '*gongsu*' (company) + farm households

A leading enterprise is a company or a collective enterprise. Looking at these companies or collective enterprises by industry, processing, transportation, and selling of agricultural produce is the central industry. A company or a collective enterprise forms an organic association with the production base and farm households by contract. Such a unified management aims at forming an economic community of risk sharing and profit sharing. The contract includes the term of the guaranteed purchase of agricultural products with the protective price.

(2) the type of the leading industry : the leading industry + farm households

This type aims at the '*yi ye yi xiang*' (one industry one township) and the '*yi cun yi pin*' (one village one product).

(3) the type of the intermediary organization: the association of production, processing, and sales of agricultural produce or the specialized cooperative association of agriculture + farm households

The UAI is a sort of the new two-tier management system. Although the process of

the UAI is going on, there are several problems to be solved. the relationship between the diversification and simplification of forms and ownership of economic organizations, (2) the relationship between the management under economies of scale and agricultural development, and (3) the relationship between the 'longtou' and farm households, i. e., mainly the distribution of profit.

Generally speaking, it should be noted that local governments always attract industrial and commerce enterprises to invest in agriculture by preferential measures to encourage the UAI.

VIII. Concluding Remarks

Agricultural reforms starting with 1978 have adopted the price policy of raising prices of agricultural produce as a means of economic liberalization. It is not until 1985 that the State Council formally changed the government procurement into the government contract purchase system, deciding to introduce the market mechanism. In the reform of grain distribution system in 1992 the government introduced the two-tier grain management system at the central and local governments, the buffer stock system and the protective price system. Rich grain harvests every year after 1996 brought about overproduction, leading to the decrease in market prices of grains. At last the government had to put the protective price system into action. In addition to that, since 1996 the terms of trade between industry and agriculture have not favored of agricultural sector. These facts show the limitation of price policy. Now China should not rely on price policy but on structural adjustment policy, taking trade liberalization into account. Nevertheless, the State Council introduced the governor responsibility system for the rice bag to maintain the planted areas and the mayor responsibility system for the vegetable basket to keep the planted areas of vegetables. This shows that the government is going back to the planned economy in adopting administrative rather than price means.

In terms of organizational innovation, People's Communes was collapsed and the household responsibility system evolved into the two-tier management system aiming at the forming family farms. The two-tier management system is evolving into the UAI.

The industrialization of agriculture in China is a sort of the new two-tier management system and calls for the liberalization of farmland, labor, and capital markets. The first agricultural census³³ in China in 1997 showed an interesting fact that part-time farm households mainly engaged in agriculture shared 33.57 percent of all farm households, sharing more than a half of full-time farm households. Given

this fact, development of the labor market is the most essential to that of the agricultural sector in China. Thus the government should play a very important role of establishing a social safety net. At present China is not facing a food problem but a peasant problem that Schultz³⁴ mentioned. The government should address itself to many issues regarding public goods, including R&D the RECOs should have carried out.

Notes

- (1) Zhongguo gongchandang (Chinese Communist Party) (1978). However, this document was not published in China. See Taiwan's Journal, *Zhongguo yanjiu*, No.9 (1979).
- (2) Zhongguo gongchandang (1978). See *Zhongguo yanjiu*, No.9 (1979).
- (3) *Renmin ribao* (People's Daily) on Oct. 3, 1979.
- (4) Concerning the agricultural responsibility systems, see Yamamoto (1983).
- (5) Zhongguo gongchandang (1983).
- (6) Zhongguo gongchandang and Guowuyuan (State Council) (1984).
- (7) Zhongguo gongchandang and Guowuyuan (1985).
- (8) Zhongguo gongchandang and Guowuyuan (1986).
- (9) Zhao (1986).
- (10) Zhongguo gongchandang zhengzhiju (the Political Bureau of the CCP) (1987).
- (11) Zhongguo gongchandang and Guowuyuan (1990).
- (12) Zhongguo gongchandang (1991).
- (13) Guowuyuan (1992).
- (14) Guowuyuan (1994).
- (15) Guowuyuan (1993).
- (16) Yamamoto (2000).
- (17) Zhongguo gongchandang (1995).
- (18) Li (1996).
- (19) Editorial of *Renmin ribao* on Dec. 11, 1995.
- (20) Jian (1997).
- (21) Li (1997).
- (22) *Renmin ribao* on Mar. 20, 1998.
- (23) Zhu (2000).
- (24) Guowuyuan (1998).
- (25) Preobrazhensky (1965).
- (26) Ma (1957).

- (27) See Chap. Four of Tang(1984).
- (28) The Information Office of the CCP(1996).
- (29) Tang(1984).
- (30) See Ma(1971).
- (31) Ikegami(1996).
- (32) Based on Niu(1997).
- (33) *Renmin ribao* on Dec. 31, 1997 and on Jan. 12 and 20 .
- (34) Schultz(1945).

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